

What Is Claimed Is:

1. An image forming apparatus comprising:
plural image forming units that form respective
5 color visible images by electrostatically applying
different color developers onto respective color
image holders;

a belt transfer member, in contact with the
respective color image holders, to sequentially
10 overlay-transfer the developers applied on the image
holders of the image forming units;

intermediate transfer electrode members,
positioned on an opposite side to the image holders
of the image forming units, via and in contact with
15 the belt transfer member, that receive application
of a primary transfer voltage so as to
electrostatically transfer the images from the image
forming units onto the belt transfer member; and

a paper transfer electrode member, positioned
20 on an opposite side to a backup member, via and in
contact with the belt transfer member, that receives
application of a secondary transfer voltage so as to
transfer the visible images transferred on the belt
transfer member onto a print sheet at a time,

25 wherein the primary transfer voltage is applied
to the plural intermediate transfer electrode
members from one power source.

2. The image forming apparatus according to claim 1, wherein in the belt transfer member, a relative dielectric constant, a surface resistance and a volume resistance are controlled so as to attenuate a potential charged upon initial transfer to 1/3 or lower than the primary transfer voltage before a belt position of the initial transfer arrives at a next transfer position.

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3. The image forming apparatus according to claim 2, wherein in the belt transfer member, the relative dielectric constant is 8 or greater, the surface resistance is 1×10^9 to $1 \times 10^{11} \Omega/\square$ by measurement at 1000 V, the volume resistance is $10^{10} \Omega \cdot \text{cm}$ or higher by measurement at 100 V and 1×10^8 to $1 \times 10^{10} \Omega \cdot \text{cm}$ by measurement at 500 V.

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4. The image forming apparatus according to claim 3, wherein the intermediate transfer electrode member is a transfer roller having a sponge layer on its periphery, and has a resistance of 1×10^5 to $1 \times 10^7 \Omega$.

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5. An intermediate transfer belt used for primary transfer to electrostatically and sequentially overlay-transfer images of different color

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developers, formed on plural image holders arrayed in a belt movement direction, onto a belt transfer member, and for secondary transfer to transfer the overlaid images onto a print medium at a time,

5 wherein a relative dielectric constant, a surface resistance and a volume resistance are controlled so as to attenuate a potential charged upon initial primary transfer to 1/3 or lower than the primary transfer voltage before a belt position of the
10 initial primary transfer arrives at a next primary transfer position.

6. The intermediate transfer belt according to claim 5, wherein the relative dielectric constant is
15 8 or greater, the surface resistance is 1×10^9 to $1 \times 10^{11} \Omega/\square$ by measurement at 1000 V, the volume resistance is $10^{10} \Omega \cdot \text{cm}$ or higher by measurement at 100 V and 1×10^8 to $1 \times 10^{10} \Omega \cdot \text{cm}$ by measurement at 500 V.

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7. A volume resistance measurement method for intermediate transfer belt used in an image forming apparatus, comprising:

a measurement step of applying an arbitrary
25 transfer voltage to be measured between electrodes in contact with front and rear surfaces of the intermediate transfer belt and measuring an

attenuation characteristic of a belt potential to elapsed time from stoppage of application of the transfer voltage; and

a calculation step of calculating a volume
5 resistance ρ depending on a change of the belt potential, based on a result of measurement of the attenuation characteristic of the belt potential.

8. The volume resistance measurement method
10 for intermediate transfer belt according to claim 7, wherein at the measurement step, the belt potential is measured by predetermined time Δt from the stoppage of application of the transfer voltage,

and wherein at the calculation step, assuming
15 that the belt potential at time t_n is $V(t_n)$; the belt potential at time t_{n-1} previous of the time t_n by the predetermined time Δt , $V(t_{n-1})$; ϵ^* , a relative dielectric constant; and ϵ_0 , a vacuum dielectric constant of 8.854×10^{-12} [F/m], the volume
20 resistance ρ depending on the belt potential $V(t_n)$ is calculated by:

$$\rho[V(t_{n-1}) - V(t_n)]/2 = \Delta t / \{\epsilon^* \epsilon_0 (\ln V(t_{n-1}) - \ln V(t_n))\}$$

9. An image forming apparatus comprising:
25 plural image forming units that form respective color visible images by electrostatically applying different color developers onto respective color

image holders;

a belt transfer member, in contact with the
respective color image holders, to sequentially
overlay-transfer the developers applied on the image
5 holders of the image forming units;

intermediate transfer electrode members,
positioned on an opposite side to the image holders
of the image forming units, via and in contact with
the belt transfer member, that receive application
10 of a primary transfer voltage so as to
electrostatically transfer the images from the image
forming units onto the belt transfer member; and

a paper transfer electrode member, positioned
on an opposite side to a backup member, via and in
15 contact with the belt transfer member, that receives
application of a secondary transfer voltage so as to
transfer the visible images transferred on the belt
transfer member onto a print sheet at a time,

wherein the primary transfer voltage applied to
20 the plural intermediate transfer electrode members
and the secondary transfer voltage applied to the
paper transfer electrode member are supplied from
one power source.

25 10. The image forming apparatus according to
claim 9, wherein the secondary transfer voltage is
directly supplied from the power source to the paper

transfer electrode member,

and wherein the primary transfer voltage, from the power source and lowered via a voltage drop member, is supplied to the plural intermediate
5 transfer electrode members.

11. An image forming apparatus comprising:
plural image forming units that form respective color visible images by electrostatically applying
10 different color developers onto respective color image holders;

a belt transfer member, in contact with the respective color image holders, to sequentially overlay-transfer the developers applied on the image
15 holders of the image forming units;

intermediate transfer electrode members, positioned on an opposite side to the image holders of the image forming units, via and in contact with the belt transfer member, that apply a primary
20 transfer voltage to transfer portions so as to electrostatically transfer the images from the image forming units onto the belt transfer member;

a paper transfer electrode member, positioned on an opposite side to a backup member, via and in
25 contact with the belt transfer member, that receives application of a secondary transfer voltage so as to transfer the visible images transferred on the belt

transfer member onto a print sheet at a time; and

a primary transfer power source to apply the same primary transfer voltage commonly to the plural intermediate transfer electrode members,

5 wherein resistance values of the plural intermediate transfer electrode members are set to a higher value for a transfer portion in which a number of overlaid colors is smaller and to a lower value for a transfer portion in which a number of
10 overlaid colors is larger.

12. An image forming apparatus comprising:

plural image forming units that form respective color visible images by electrostatically applying
15 different color developers onto respective color image holders;

a belt transfer member, in contact with the respective color image holders, to sequentially overlay-transfer the developers applied on the image
20 holders of the image forming units;

intermediate transfer electrode members, positioned on an opposite side to the image holders of the image forming units, via and in contact with the belt transfer member, that apply a primary
25 transfer voltage to transfer portions so as to electrostatically transfer the images from the image forming units onto the belt transfer member;

a paper transfer electrode member, positioned on an opposite side to a backup member, via and in contact with the belt transfer member, that receives application of a secondary transfer voltage so as to transfer the visible images transferred on the belt transfer member onto a print sheet at a time; and

a primary transfer power source to apply the same primary transfer voltage commonly to the plural intermediate transfer electrode members,

wherein compensation resistors are provided between the primary transfer power source and the plural intermediate transfer electrode members, and resistance values of the compensation resistors are set to a higher value for a transfer portion in which a number of overlaid colors is smaller and to a lower value for a transfer portion in which a number of overlaid colors is larger.

13. An image forming apparatus comprising:

plural image forming units that form respective color visible images by electrostatically applying different color developers onto respective color image holders;

a belt transfer member, in contact with the respective color image holders, to sequentially overlay-transfer the developers applied on the image holders of the image forming units;

intermediate transfer electrode members,
positioned on an opposite side to the image holders
of the image forming units, via and in contact with
the belt transfer member, that apply a primary
5 transfer voltage to transfer portions so as to
electrostatically transfer the images from the image
forming units onto the belt transfer member;

a paper transfer electrode member, positioned
on an opposite side to a backup member, via and in
10 contact with the belt transfer member, that receives
application of a secondary transfer voltage so as to
transfer the visible images overlay-transferred on
the belt transfer member onto a print sheet at a
time; and

15 a primary transfer power source to apply the
same primary transfer voltage commonly to the plural
intermediate transfer electrode members,

wherein the plural intermediate transfer
electrode members are conductive members provided in
20 positions away from contact positions between the
respective color image holders and the belt transfer
member in a belt surface direction,

and wherein distances from the contact
positions are set to a shorter value in a transfer
25 portion in which a number of overlaid colors is
larger and to a longer value for a transfer portion
in which a number of overlaid colors is smaller.